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The Delayed Transformation

Restructuring in the Automobile, Chemical, Clothing and Machine-tool Industries

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by
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Abstract

In this paper, we focus on the results of the Belgian Trend Study. The intention of this study was to examine the prevalence of new production concepts within the widest possible range of companies in the automobile, the machine-tool, the chemical and the clothing industries. The Trend Study aimed to answer the following questions : is the Taylorist division of labour a thing of the past ? What are the alternatives ? Are shifts in the division of labour accompanied by another type of personnel policy, and do traditional industrial relations have to make way for this new approach ? The methodological concept used had to guarantee that the findings at the level of each industry could be generalised. Though the picture emerging from the empirical data collected in the four industrial sectors is inevitably diverse, the data make it possible merely to suggest a 'neo' rather than a 'post' Taylorist or Fordist concept.

1. Fordism

The French Regulation Theory starts from the realisation that stable regimes of capital accumulation do not become established automatically but depend on *regulation* (Jessop, 1990). A regime of accumulation is made viable by a mode of regulation, understood as the institutional ensemble and the complex of cultural

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habits and norms which secures capitalist reproduction as such. The mode of regulation therefore refers to institutions and conventions which 'regulate' a given accumulation regime (Amin, 1994; Nielsen, 1991). Among the structures and behavioural patterns constituting the mode of regulation, some of the following are regularly quoted by the regulationists : the forms of wage relation (mode of life of the wage-earning class, composition of the work force, legal organisation of the wage relation, rationale for workers' acceptance of the rules of the game, etc.), the forms of enterprise (internal organisation, regulation of competition, source of profit, etc.), the banking and credit system, the role of the state (domains of state intervention, prevailing tools of intervention, etc.) and the international regime (trade, investment, monetary regulation, etc.) (Boyer, 1986; De Vroey, 1984; Lane, 1995).

Regulation Theory posits a 'stages' model of history. It seeks to identify the driving forces in each historical stage and, through this process, to elaborate how these forces constitute a 'regime' capable of securing relative economic stability over the long term (Amin, 1994). The post-war stage became known as the Fordist regime. Fordism is seen as a specific mode of regulation, partially and temporarily securing the stabilisation and reproduction of the unstable and crisis-ridden capitalist mode of production. The Fordist regime was characterised by intensive accumulation and monopolistic competition. The production paradigm ('form of enterprise') had the features of mass production of standardised commodities for stable 'mass' markets, subjected to a high division of labour and tight managerial control. The post-war employer/employee compromise (workers' acceptance of modernisation in return for an assurance that their standard of living would benefit from the resultant productivity gains) is what lent momentum to the gradual consolidation of a Fordist wage relation (Boyer, 1988).

After 1950, mass consumption developed in tandem with the modernisation of productive systems. This parallel between change in production norms and transformation of consumption norms was the driving force of Fordism. On the one hand, mass production based on the application of Taylorist work organisation yielded economies of scale and a reduction in unit labour costs, allowing productivity to increase when output increased and plants operated at close to full-capacity utilisation (Appelbaum and Batt, 1995). On the other hand, unions in these mass production industries bargained for real wage increases in line with average gains in productivity in the economy as a whole. At the same time, oligopolistic price behaviour meant that profits grew in line with productivity while the relative price of standardised mass produced products fell. The result was that rising real wages and falling relative prices supported the growth of consumption. The sharing of productivity gains between workers, firms and customers meant that productivity growth favoured demand growth.

2. The crisis of Fordism

From the early 1970's onwards, the Fordist regime entered a 'major' crisis : an episode in which the dynamic of the system itself conflicts with the network of structural forms on which the system of accumulation and method of regulation are based (Boyer, 1988). Several factors contributed to this major crisis. Firstly, the expansion of mass production led to an increasing globalisation of economic flows which made national economic management increasingly difficult. At the same time, the increasing competition from companies in the newly industrialised nations in price competitive markets for standardised production undermined the growth of real wages. This caused the motor of the consumption dynamic to starting sputtering. Secondly, Fordism led to a growing social expenditure (Nielsen, 1991). The relative costs of collective consumption increased, because of the inapplicability of mass production methods in this area (leading to inflationary pressures and distributional conflicts). Thirdly, with the rise of increasingly differentiated and segmented markets combined with more discriminating consumer tastes, the rigidity of mass production methods in their dedication to the production of standardised commodities has been exposed (Boyer, 1991).

The Regulation School is much admired for the clarity of its synthesis of this major crisis of Fordism. It has to be noted however, that the Regulationists have been very hesitant in defining emerging, new models of development and specifying the degree of rupture with the Fordist regime. It sees the present as a period of experimentation with various strategies to resolve the bottlenecks of Fordism. For this reason, most regulationists are less anxious to fix the name of the new 'stage', hesitating between neo-Fordism, post-Fordism, flexible accumulation, Toyotaism, etc. Arguments exist over the bearers of change and the shape of things to come. Full specification of new modes of regulation is rarely attempted. Analyses mainly focus on what is empirically observable : the contours of a new 'wage relation' (research into the degree of decentralisation of collective bargaining, into deregulation in labour markets, etc.) and new 'forms of enterprise' (paradigmatic change in the nature of work and industrial organisation).

The new 'forms of enterprise' are discussed in ideal-typical terms as either neo- or post-Fordist. In this debate, neo- and post-Fordism are not analysed as specific modes of macroeconomic growth or modes of social and economic regulation as such (Jessop, 1991), but rather as distinctive types of labour process or industrial paradigm. In the post-Fordist literature, the Fordist-Taylorist model of the vertically integrated firm, devoted to mass production, is associated with rigidity and is pronounced to be unable to respond the new challenges. This is seen as an argument for radical organisational transformation. The neo-Fordist tradition starts from the realisation that the current situation is a very mixed one in which

old Fordist and Taylorist principles of organisation co-exist with neo-Fordist and neo-Taylorist ones, combining economies of scale with economies of scope and quick responses to the market (Boyer, 1991).

The main problem in this 'neo versus post' debate is that, despite the widespread interest in organisational transformation, our understanding of what has taken place in workplaces still is relatively poor. There is much rhetoric on the need for strategic change, whether it be through reengineered corporations (Hammer and Champy, 1993), greater worker empowerment through teams (Stewart, 1993) or simply through recognising the centrality of knowledge in high performance organisations that will characterise post-Fordism (Drucker, 1993). Undoubtedly, a growing minority of companies have already made a commitment to transform their work systems into high-performance organisations. But whether the transformations can truly be found 'across the board' in industry remains an open question. The following issues therefore ought to stand at the top of the research agenda:

- *Are structural changes becoming apparent?*
  The picture of the 'transformed firm' that emerges in management literature probably overstates the degree of innovation and change actually taking place. Managers rarely report failed efforts. Even academic studies of workplace change have tended to focus on best-practice cases in an effort to measure the impact of workplace innovations on performance. The central question is whether the structural transformations can be observed across the board in trade and industry. By structural transformations, we mean major innovations in management methods, production organisation and organisation of work, or human resource practices which have an impact on the relationship between labour and capital, on the structure of labour markets or, more in general, on industrial and economic policy (Appelbaum and Batt, 1995).

- *Are structural transformations required?*
  Can reforms at the margins of the Fordist-Taylorist organisational model meet the challenges faced by production systems, or are structural transformations required? An intervention 'at the margins' would be, for example, the introduction of computer-aided technology in order to increase flexibility, all the while maintaining the traditional characteristics of the production system.

- *Is a 'one best way' becoming apparent?*
  Various production models have been launched in the past decade, all of which break with the Fordist-Taylorist organisational model at a number of important points: lean production (Womack, Jones and Roos, 1990), flexible specialisation

(Piore and Sable, 1984), the Swedish style sociotechnical approach (Berggren, 1992), diversified quality production (Streeck, 1992), the new production concepts (Kern and Schumann, 1984), systemic rationalisation (Altmann et al., 1986) and business process re-engineering (Hammer and Champy, 1993). Research into the degree of penetration of new forms of organisation into trade and industry must always assess whether one of these models is dominant, whether in terms of degree of dispersion or in terms of effects on company performance. The central question here is whether there is in fact a 'one best way', or whether the models relate to one another as functional equivalents.

In the search for innovative trends, a clear distinction must always be made between intentions and outcomes. In other words, we need to determine not only the nature and the rapidity of technical, organisational an social innovations, but we also need to look for the obstacles to success. Thus, in their analysis of BPR projects, Oram and Wellins (1995) speak of a failure percentage which fluctuates around 80%. They maintain that in BPR projects attention is focused too one-sidedly on the maximal utilisation of the potential for information technology.

3. New production concepts

In this contribution, the focus is on the Regulationist 'new forms of enterprise'-debate. The central question is whether the structural transformations under consideration can be observed across the board in trade and industry. To this end, we have to examine the diffusion of innovative organisational practices. A problem arises here, however. The term 'innovative' work practices has no settled meaning (Ichniowski et al., 1996). For many scholars, it refers to employee involvement efforts such as work teams. Others have in mind flexible and broadly defined job assignments, improved communication, forms of profit sharing or special workplace 'cultures'.

One way to get around this lack of unambiguity is to check one of the production models in question as to its degree of penetration. The model for the new production concepts proposed by Kern and Schumann is taken as the norm in the Trend Study on Technical-Organisational Innovations, from which a few empirical results will be presented in this contribution. Their observations in the chemical, automobile and machine-tool industries led them to report a development which would threaten the dominant position of Taylorism as the dominant production concept of the Fordist regime (Kern and Schumann, 1984). They observed the rise of *new production concepts* and portrayed these as rationalisation processes which the companies in question were being forced to accept in order to keep their heads

above water in the competitive international arena. At the same time, however, these concepts also offered workers new opportunities. They would make it possible to transcend the classic dichotomy between efficiency and democracy/autonomy. According to Kern and Schumann, capital had after all arrived at a point where a further rise in labour productivity could only be achieved by utilising what remained of 'living labour' in an entirely different fashion (Bader, 1988). Labour could no longer be considered a risk factor, something to kept in line by means of a maximum division of labour.

The conclusions put forward by Kern and Schumann were strongly disputed in numerous other studies. Researchers who attempted to test the general validity of their thesis concluded that the 'new production concept' distinguishes itself by its conceptual vagueness. But *Das Ende der Arbeitsteilung?* was criticised primarily because of the restricted empirical basis for its conclusions. The fact that these conclusions were based only on a limited number of in-depth case studies meant that the need for representative data was acknowledged on all sides. Schumann's SOFI research team bowed to this criticism (Schumann et al. 1989; Schumann et al. 1991). In the *Trendreport Rationalisierung in der Industrie*, the SOFI team developed a methodology which they considered suitable for collecting representative data at periodic intervals on the production concepts applied in trade and industry (Schumann et al. 1994).

The gauntlet was taken up in Belgium as well. The Belgian *Trend Study* was launched in 1991, developing from a similar ambition regarding methodology and substance (Huys, Sels and Van Hootegem, 1995). This study can be viewed as an empirical test of the predictions relating to new production concepts. In recent years the focus of attention has been primarily on car assembly, the machine-tool industry, the chemical sector and the clothing industry. The ambition in each case has been to provide answers which are capable of generalisation at the sector level.

For the Trend Study team, the initial task was to tackle the two basic problems of *Das Ende der Arbeitsteilung?*, namely its conceptual vagueness and its restricted empirical basis. The main challenge was to describe the term 'production concept' in such a way that it would be possible to distinguish traditional from new production concepts. A second task was to develop a methodology, suitable for collecting representative data at periodic intervals on the production concepts applied in industry. This section is structured in the following way: first is a brief summary of the multidimensional framework used to distinguish traditional from new production concepts; the second part comments on the methodology of the Trend Study.

3.1 Conceptual fine-tuning

In the Trend Study, four components were examined in evaluating the diffusion of 'new production concepts': deconcentration linked to job integration, and product-oriented production linked to job enlargement. Let us briefly explain.

Deconcentration and job integration

In a rare effort to make things explicit, Schumann provided a figure which visualises the transition from traditional to new production concepts (Schumann, 1988).

Figure 1. The transition from traditional to new production concepts

The new things are to be looked for in the integration of supporting and preparatory staff services into the production departments: trimming down of staff services, merging of staff and production departments, assignment of staff functions to the line management. The integration of supporting and preparatory responsibilities into production jobs on the shop floor is also an ingredient of the new production concept.

In order to operationalize this central characteristic of the new production concepts, a distinction was made in the Trend Study between concentration and deconcentration. Concentration means that separate staff services fulfil the various functions related to supporting and preparing for production: planning, product development, maintenance, quality department, logistics, supervision of tools, training department, etc. These services then operate in a supportive and preparatory manner for (nearly) all production departments. Deconcentration implies that the various production departments are given their own maintenance facilities, quality control positions, etc.

The diversity of empiricism, however, cannot be grasped in terms of this dichotomy. In order to introduce more variation, we take the localisation of machine programming (preparation) in machine-tool companies as an example. In a situation of maximum concentration, the programs for all production depart-

ments are written in a single programming department. An initial move towards deconcentration involves splitting up the concentrated programming department into local offices, each of which is assigned to a single production division. A second step implies that the separation between programming bureaus and production divisions should be done away with and that the task of programming should become a responsibility of the production divisions. This does not necessarily mean that the production employees do the programming themselves, since these production divisions can opt for functionalisation. The task of programming is then assigned to specialised programmers who work within the production department. Only after defunctionalisation does the programming work come into the hands of the production workers. The separate job of programmer is then done away with.

If companies opt for a maximal concentration of supportive and preparative tasks, production divisions are supposed to direct all their efforts towards execution or production. *Segregated* production jobs, consisting exclusively of direct executive tasks, are the result. Taylorism advocates such a removal of indirect tasks from production jobs. Once preparatory or supportive functions are deconcentrated and integrated into production divisions, there is more room for *integrated* production jobs consisting not only of executive tasks, but also of preparatory (e.g. programming, setting of equipment) and supportive (e.g. maintenance, quality control) tasks. Integrating preventive maintenance and repair functions into production jobs or teams reduces downtime and allows for quick intervention in the case of machine failure. Integrating quality control into the work groups improves quality and reduces the amount of rework.

Product oriented production and job enlargement

As far as production itself is concerned, firms can choose between three basic structures, by which we mean alternative ways of organising the flow of the production process; of splitting up, regrouping and linking operations:

- In an *operation-oriented* structure, identical operations are grouped into production divisions. Each division specialises in one or a few operations. When applied to metal cutting and shaping, for example, this means that operations involving turning, milling, drilling, etc. are each grouped into their own category. Orders of largely non-identical products pass through all or a few of these specialist production divisions in a series. The order of sequence is relatively open. The operation-oriented structure is more amenable to this type of flexible linking than are the flow-oriented and product-oriented structures. But this high level of flexibility comes at a price: a relatively low level of productivity. Operation-oriented structures are often plagued by long routing times and large intermediate stocks.

- As soon as the sequence of operations is more or less fixed, the operation-oriented structure loses much of its flexibility and tends to develop into the second variant, the *flow-oriented structure.* The products go through all of the necessary operations in a fixed and sequential order. The link is clear: there is one sequence, one route, the entire affair is highly structured but at the same time non-adjustable. The strength of the flow-oriented structure is said to be a relatively high potential productivity. Its weakness is the limited product mix and volume flexibility.
- In a *product-oriented* structure, one product is (largely) finished in a clearly demarcated processing phase. Each production division makes one type of product. The operations and machine tools required to perform that one product are grouped together. The link between the processing steps is once again clear. The process moves in one direction, but takes multiple routes.

Product-oriented production is supposed to be most suitable for keeping down the number of control or co-ordination problems in an unstable, dynamic environment. Conversion from a line-oriented to a product-oriented structure is supposed to lead to an increase in flexibility, with productivity being held constant - and conversion from an operation-oriented to a product-oriented structure to an increase in productivity, with flexibility being held constant (Ten Have, 1993; De Sitter, 1994).

The nature of the production structure determines whether job enlargement is possible. Indeed, within a division or part of a process only those tasks can be grouped as jobs which are also effectively assigned to that division or that part of the process. This is determined by the structure of the production process. Since in flow and operation-oriented structures production divisions specialise in one or a limited number of operations, these are admirably suited to fulfilling the Taylorist ideal of *narrow jobs* (consisting of short-cycled, repetitive tasks). By contrast, in a product-oriented structure a number of operations - and hence tasks - required for the production of a single product are brought together. This versatility can translate into *broad jobs* which group together a wider range of tasks or operations.

From 'traditional' to 'new'

Table 1 shows which values are implicit within the traditional and the new production concepts.

Table 1. Taylorist versus new production concept

Traditional	New
In line or operation-oriented	Product-oriented
Concentration	Deconcentration
Centralisation	Decentralisation
Small jobs	Broad jobs
Segregated jobs	Integrated jobs

Deconcentration results in some supporting and preparatory functions being delegated to production divisions. This increases the chances for having integrated production jobs. Deconcentration also facilitates decentralisation of operational decision-making to operational units. Decentralisation is internal change of a structural kind, resulting in a reduction of the management hierarchy. The result of decentralisation would be flatter managerial hierarchies.

Although the Trend Study can be viewed as an empirical test of the predictions relating to new production concepts, we would nevertheless add to this the fact that the different dimensions of the multidimensional framework presented are also to be found either separately or in combination in other production models. In the present BPR-debate, for example, these ingredients are seen as central features of the re-engineered flexible production system too. According to Hammer and Champy (1993) such flexible production systems are brought about by changing work units from functional units to process teams (product-oriented production); jobs from simple tasks to multidimensional work (integrated jobs); organisational structures from hierarchical to flat (deconcentration) and executives from scorekeepers to leaders (decentralisation) (Francis and Southern 1995: 115).

The same holds for the model of diversified quality production. Streeck (1992: 6) characterises the tendency towards diversified quality production as "a restructuring of mass production in the mould of customised quality production, with central features of the latter being blended into the former and with small batch production of highly specific goods becoming enveloped in large batch production of basic components or models". An important characteristic of diversified quality producers is their reliance on redundant capacities. These capacities, which the firm calls on only occasionally, include investments in broad worker skills (job enlargement), flexible work roles and organisation units, duplication and overlap in organisational structures as functional boundaries are blurred (deconcentration) and decentralised competence (Streeck, 1992; Sorge and Streeck, 1988).

Swedish sociotechnical firms seek a more decentralised and flexible organisation of production in order to be more responsive to the new competitive conditions. Deconcentration is an important precondition for Swedish style sociotech-

nical redesign. It is a precondition for the installation of teams that regulate themselves internally and that are responsible for pacing, co-ordination, sequencing and quality control. Production teams are responsible not only for direct production tasks, but also for routine maintenance and housekeeping and administrative tasks such as distributing work assignments among group members (job integration).

Each of these models has its own 'source of competitive advantage'. Moreover, these models differ in their mobilisation of the work force and the relative weight they give to the strategic value of human resource and industrial relations practices. All share some common practices, however : the use of flexible technologies, some form of team work or worker participation, the flexible deployment of workers, a narrowing of the gap between workers and managers. Moreover, they all depart from the traditional work systems, characterised by tightly defined jobs, clear lines of demarcation separating the duties and rights of workers and supervisors and decision making powers retained by management (Kochan, Katz and McKersie, 1986).

3.2 Survey research required

It was the Trend Study team's intention to make the multidimensional framework sufficiently generic. It had to provide a superior basis for intersectoral comparison and hence to be applicable to a variety of organisational types. To ensure that the framework was in fact capable of performing this function, an operational instrument had to be derived from it for field research. The operational instrument finally had to undergo a translation for each industry before standardised questionnaires could be drafted for the respective industries. The search for new production concepts called for the formulation of fairly branch-specific questions. However, backing up each branch-specific translation with the same generic framework guaranteed comparability.

To acquire enough familiarity with the field, the researchers carried out extensive case studies (site visits and interviews with multiple respondents in different roles) prior to their survey research. The case studies were an indispensable step in translating the generic framework into a branch-specific instrument. Their purpose was to show the research team how to map out the production processes involved using a standardised questionnaire. Research into organisational change becomes less nuanced when questionnaires are used, but thorough preparation by means of intensive case studies can perform miracles. What happened in the Trend Study is that the insights gained in the case studies were tested for their general applicability by using standardised questionnaires.

Two different questionnaires were sent to the companies. The first, which focused on the employment relationship and company-level industrial relations, went to the personnel manager; the second, which focused on the production concept, to the production manager. The questions were restricted to an exploration of the facts as they stood at the time. There were no questions dealing with expectations for the future. It seemed to us that it would be more accurate to repeat a reliable series of snapshots periodically - this is why the project is named a *Trend* Study - and determine the shifts ourselves in the future.

A final point regarding the research procedure concerns the unit of analysis. Some variables were collected for the entire company. However, detailed information on work organisation was obtained at the level of specific divisions or process segments within the company. This is because no single answer regarding 'new work practices' is likely to be applicable to all divisions or process segments within a firm.

Table 2. Number of observations

	Chemical industry	Automobile industry	Machine-tool industry	Clothing industry
Number of companies	77	5	47	54
Number of divisions	154	15	104	123
Number of employees	11.373	32.420	5.975	5.467
Response ratio	75%	100%	33%	90%

It was the Trend Study team's intention to cover all establishments with fifty or more employees. The Trend Study data are therefore based not on a random sample survey but rather on a procedure in which an attempt was made to involve in the study an entire population of companies as defined by certain criteria. A strictly defined follow-up procedure was rewarded by a considerably high rate of response. Various details are presented in Table 2.

4. Some results of the sector surveys

This section will concentrate on transformations in production and work organisation affecting the use of labour in the automobile, the clothing, the chemical and the machine-tool industries. The central question is whether a tendency in the direction of 'new production concepts' is in fact becoming apparent in the sectors studied.

4.1 Car assembly

Looking at organisational charts of car assembly plants, changes are readily apparent. Centralised staff departments have been slimmed down and split up to separate production areas. Subsequent process parts such as welding, painting and assembly have been transformed into so-called business units. They have become partly self-sustaining with regard to maintenance, quality control, engineering, material handling and even personnel policy (deconcentration). But, more strikingly, the integration process has not stopped there. Indeed, these supporting functions are also being partially integrated into the production groups or teams. In general, production groups have become quite heterogeneous. They are no longer merely involved in production, but have to be concerned about support of production within their own area. By consequence, first line supervisors have acquired a much broader area of responsibility (decentralisation).

Table 3 shows the composition of the production groups under the supervision of the first level of the production hierarchy. The Table relates only to the body shops of the respective car assembly plants.

Table 3. Indirect functions integrated into production groups (body shops).

	Plant A	Plant B	Plant C	Plant D	Plant E
Machine operator	-	+	+	+	+
100% inspector	-	+	-	+	+
Audit inspector	-	+	-	-	+
On- & off-line repair	+	+	+	+	+
Material handler	+	+	-	-	-

The remarkable fact is that these deconcentration processes are not resulting in job integration, broader responsibility or autonomy for the production workers. One inhibiting factor is the manner is which the production process is designed. Ford's assembly line (line structure) has endured the test of time. During the eighties, alternative lay-outs were introduced that parallelized the workflow and re-established a certain degree of time sovereignty for production workers (Auer and Riegler, 1990). The most well-known case of this was the Volvo plant at Uddevalla (Sweden). This plant made a complete break with the line principle. Teams of roughly 10 workers took on responsibility for the total final assembly of a car (product-oriented structure). While not following such a large-scale and radical break with the driven belt, other car manufacturers have introduced alternative production structures as well (Jürgens, Malsch and Dohse, 1993). Indeed, Belgian affiliates of the car companies have also introduced alternative production lay-

outs like modular production during the eighties. The use of modular production for certain forms of off-line assembly work, for instance, allows longer work cycles for the completion of sub-assemblies than does a moving assembly line, and this can be taken as evidence of job enlargement (Dankbaar, 1988).

Our current findings, however, do not support even this modest optimism on a 'mixture' of modular and line production. On the contrary, where modular production has been introduced it has later been scrapped. Through reduction in stocks, if possible without any buffer, workers in other subassemblies are tied equally directly to the main process flow. The pacing effect of the main assembly belt is increasingly spreading to all areas and corners of the assembly plant. More workers than ever before are finding themselves confronted with short-cycled and tightly paced work. To illustrate this, takt-times of the final assembly lines in all five plants are shown in Table 4. While takt-times are not necessarily equal to cycle-times, for most production jobs the two are essentially the same.

Table 4. Takt-times valid for most of the production workers in final assembly

	Plant A	Plant B	Plant C	Plant D	Plant E
Takt-time (seconds)	50	41	97	88	65

An intensification of the line is apparent, and is coupled to the implementation of a single production line on which different body-styles and even different models are assembled. This is testimony of the driven belt's increased flexibility, and is one of the reasons for the demise of modular production.

Because production workers are bound to the assembly line, it is difficult to have them carry out other tasks such as quality control or maintenance. The production jobs are therefore not only narrow, but also segregated. Nevertheless, the automotive companies continue to be interested in integrating additional responsibilities into production jobs. One of the primary means of achieving this is to disengage production workers from the assembly line for a part of the working hours and to assign them temporarily to jobs not tied to the line. On a temporary basis, then, they perform the supporting and preparatory tasks for their production group. The utilisation of such a mechanism remains extremely limited, however.

Moreover, it is the case that the need for flexibility compels the recognition that the operations which have been standardised from beforehand are not always equally effective. One discovers that such a thing as 'the one best way' which is most adequate in all circumstances does not exist. Here we find a role for initiative on the part of the workers. They have to let it be known when the standardised procedures are inadequate. The organisation 'learns' from these signals. But this does not at all mean that the workers are given the freedom 'to fight their own battles'. Because each proposed adaptation is in turn formalised into a standardised operation. The

organisation remains bureaucratic. At best, it becomes a 'learning bureaucracy' (Adler, 1991).

The above assertion is valid, even though as a consequence of automation new types of jobs have emerged. Schumann and his colleagues refer to these as *system regulators* which "support the machines as far as possible in their automatic operation, and intervene in the process only when this automatic operation breaks down. Where deviations from the process or disruptions take place, the worker steps in with a view to restoring 'operating competence' to the control programs as rapidly as possible. This gives his action a regulatory character vis-à-vis the process and the machinery" (Schumann et al., 1991, 33). Although it is legitimate to point to this remarkable change in work content, one should not overestimate its quantitative importance. In Table 5, the percentage of workers is indicated that can be described as system regulators in units of a car assembly plant.

Table 5. Percentage of system regulators in the respective units of the assembly plants

	Plant A	Plant B	Plant C	Plant D	Plant E
Body shop	9	11	6	8	2
Paint shop	3	5	5	5	3
Final assembly	0	0	0	1	0

Despite the attention given to the system regulators, their share of the total work force in car assembly plants remains low. Taking into account that in terms of employment the final assembly unit is on average twice as large as the body- and the paint-shop together, hardly 2% of the jobs in car assembly plants can be described as system regulators. The percentages presented in Table 5 correspond to the figures advanced by Schumann's research team (Schumann et al., 1992).

4.2 Clothing industry

The clothing industry seems to be leaving Belgium. Companies are moving their production to Eastern and Southern Europe, North Africa or Asia. With the wages for one Belgian seamstress, you can pay fifteen Thai or fifty Indonesian workers (IVOC, 1996). In the Belgian clothing industry, the labour costs absorb 78% of the added value. This makes the sector susceptible to delocalisation. In addition, clothing companies are very 'mobile' since they require so little machinery.

Some production, however, involves difficult orders which have to be filled very quickly or of which the customer needs only a small quantity. Foreign branch offices have difficulties with this type of order. Often the transport times are too long or they are unable to meet the quality requirements. The Belgian clothing

industry continues to take care of these small batch orders involving many variations. The number of product varieties clothing factories offer is bewildering, the batch-size accordingly low and the number of customers large. Production on demand is common. 87% of the clothing companies that took part in the study produce mainly on demand.

The survival chances of the clothing industry therefore are to a large extent determined by the degree to which the companies are capable of providing a 'Quick Response' to changing market demands. To achieve this flexibility one would expect changes in the division of labour or in the allocation of workers. The Trend Study team assumed that Quick Response market demands would translate into the widespread utilisation of 'standing work'. Standing work has been integrated into all kinds of new production systems, such as the Toyota Sewing System or Quick Response Systems (Peeters, 1995). In such systems each seamstress carries out a variety of operations on a single product. She works standing and moves along with the product past machines which are set up in parallel. In this sense, her job has been expanded. The focus on standing work has been accompanied by an increasing belief in the flexibility of group work (Eysackers, 1994; Roelant, 1995). Such group work implies, among other things, that the team members are responsible for a number of supporting tasks: machine maintenance, quality control, breaking in new workers, etc. (job integration).

But today, standing work as a means of increasing the mobility of seamstresses, is utilised by a mere 7 out of 123 sewing sections investigated (Huys, 1996). The general picture remains one of restricted interdependence between workplaces and limited possibilities for seamstresses to co-ordinate work. By consequence, the concept of self-sustaining teams with discretionary power to plan and distribute their own work and to monitor logistics, production output and product quality is still a far away vision in most factories. The following diagram shows that such decision and control tasks are still assigned to a hierarchical first line supervisor in most companies.

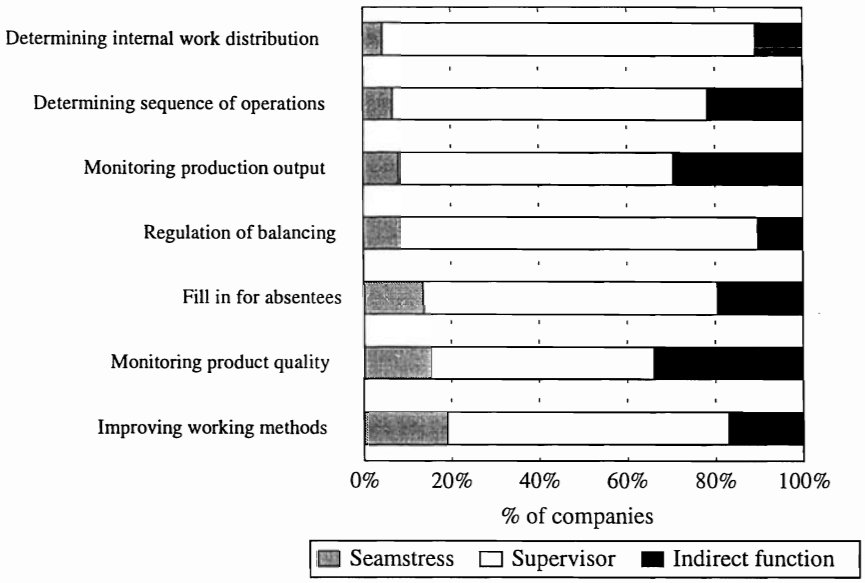

Figure 2. Options of companies with regard to decision and control tasks: who is responsible for the task ? (% of companies: n = 48)

Tasks relating to planning and quality control continue to be the domain of the supervisor or of staff personnel. For most seamstresses, machine maintenance is restricted to a few standard tasks such as replacing needles.

The production lay-out remains basically operation-oriented. Similar operations are grouped in separate production sections. The emphasis is on maximising machine-utilisation in tying seamstresses to their sewing machine. Moreover, sewing machines have become increasingly specialised in a single operation. This translates into repetitive and short-cycled work (narrow jobs). In three-fourths of the sections studied, the cycle times are less than two minutes.

Table 6. Average cycle times for seamstresses in sewing workshops (n=119 sections or departments)

Cycle times	< 0.5 min	0.5 - 1 min	1 - 2 min	2 - 5 min	5 - 10 min	> 10 min
Number of sections	6	32	43	29	6	3

Great attention is given to the automated and thorough monitoring of the work in the sewing workshops. Most companies rely on computer-controlled recording which measures the length of time required for each operation. Thus they are able to calculate the working tempo of each seamstress, which compels the personnel to maintain a constant high working tempo.

It is important to notice that staff departments are either slim or completely absent, as production workers take up the bulk of the work force and the low level of automation requires only limited assistance (Table 7).

Table 7. Distribution of the workforce according to department (n=5.467 employees)

Department	% of workforce
Production (cutting, sewing, finishing)	76,5%
Preparatory departments (planning, design, patronating, grading, ...)	7,4%
Direct support (maintenance, quality control and warehouse)	7,0%
Other staff departments (marketing, management, administration)	9,1%

Due to the small size of most clothing factories, they often require only a single mechanical engineer, quality controller or production planner to support the production process. Questions concerning deconcentration are therefore less relevant to this sector.

4.3 Chemical industry

While still a rare breed in the automobile industry, system regulators are common in the highly automated processes of the chemical industry. But this type of labour is anything but 'new' here. Indeed, already in 1964, while comparing the job profile and personnel policy in different industries, Blauner noted a quite distinct approach in the chemical industry (Blauner, 1964). Work in the core of the chemical process has never involved the mere repetitive manual execution of predetermined tasks.

On the other hand, the many system regulators in the chemical industry are not such a convincing proof of new production concepts as their counterparts in the automobile industry, as their activities are much less transfunctional. While keeping an eye on the automated welding lines and trying to detect potential trouble spots, the system regulator in the car industry comes mainly into action in case of a breakdown. Moreover, if a breakdown occurs, he is freed from attending the production process and as such is able to be concerned with maintaining the equipment.

By contrast, the running of a chemical process requires continuous attention and care from the operator, even though no alarms are triggered. The complex interdependence between the many parameters demands frequent interventions from the operator. Similarly, when maintenance of the equipment is required the production process keeps running, as a shut-down is only a final and dramatic measure. The clear-cut distinction in an automated welding line between production and a standstill is not applicable to the chemical industry. Consequently, the chemical operator is not relieved from attending the process when maintenance is required. On the contrary, in such instances his monitoring is of greater importance, while other and specific indirect specialists will take care of maintaining the equipment.

As the diagram shows, the involvement of production workers in the field of mechanical maintenance is restricted. A similar picture emerges with regard to quality analysis of products, the maintenance and programming of the measurement and control equipment, etc. What the company values in operators is their 'feeling' for the daily running of the process: a tacit knowledge which is essential for the company and which only they can acquire. Responsibilities in the support or preparation of production are kept separate and assigned to staff functions.

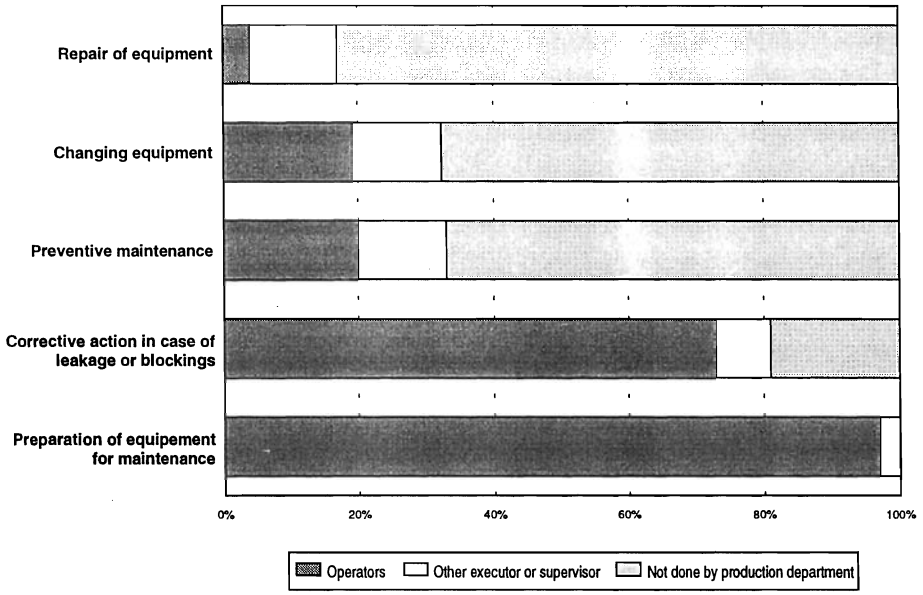

Figure 3. Options of companies with regard to mechanical maintenance tasks (N=77 plants).

This division of labour is reflected in the organisational charts of chemical plants. The trend towards deconcentration, mentioned in the automobile industry, is currently no concern for the chemical industry. Preparation and support for production are located in separate staff departments. As Table 8 illustrates, the integration of maintenance functions into production divisions is uncommon.

Table 8. Integration of maintenance functions within production divisions (n=77 plants).

	Percentage of plants
Part-time support from maintenance department	76%
Full-time support from maintenance department	11%
Inclusion of maintenance functions within production department	13%

These empirical findings are surprising, since most production facilities operate on a fully continuous basis, 24 hours a day and seven days a week. Assigning maintenance responsibility to separate departments seems to imply that these departments have to be organised on a costly, fully continuous basis as well. Yet,

most plants have an alternative strategy in which they are able to run the plant merely on the basis of a day-time support. An elaborate preventive maintenance plan, in combination with stand-by duties for some maintenance workers, allows plants to continue production without immediate assistance from staff departments.

Chemical plants have a particularly heavy hierarchy, with a limited span of control. We found on average merely four production workers under the control of first line supervisors. Important decisions on the running of the process are taken by supervisors who are present round the clock, thereby further limiting the scope of action for operators. This tight surveillance on decision-making is motivated by the great safety risks related to the operator's job (centralisation). Rather than aiming at job integration, attention is fully oriented towards eliminating co-ordination problems within the production department. Given the level of integration within automated processes, continuous co-ordination is required between the various demarcated jobs dispersed in a central control room and at the equipment site. To encourage this 'collective' thinking, workers are allocated across the various jobs. The process integration that accompanies automation increasingly demands an 'overall view' of the process. Multifunctionality is hence common in chemical plants. Personnel policy is fully geared towards establishing this multifunctionality. For instance, the level of multifunctionality acquired is the most important criterion for promotion.

Although the picture emerging from our empirical findings looks bleak with regard to the innovative work practices, a concluding remark on the relationship between the division of labour and the level of skills should be added. The remaining traditional boundaries in the division of labour do not exclude more skilled work. It is wrong to suggest that such an increase of skill requirements can merely be brought about by less division of labour (see Osterman, 1995, 132). In the chemical industry, the continuing rigid demarcation between direct and indirect tasks goes together with higher skill requirements for production workers, as the running of the increasingly integrated and complex processes demands far better trained workers.

4.4 Machine-tool industry

In the debate which followed the publication of Kern and Schumann's book, one of the questions which received too little attention was whether the industries investigated (automotive, chemical and machine tool) could be lumped into the same category. We don't think so. Kern and Schumann were wrong to assume that Taylorism, in the form of a maximum division of labour, constituted the 'old' production concept in each of the three branches, and that the new concepts in

each branch could only really flourish after confronting their common Taylorist past. This past is actually not so common as one may think (Lutz, 1988; Smith, 1989; Walker, 1989). The production concept which aims to achieve a maximum division of labour has played only a subsidiary role in the machine tool industry. In most machine-tool companies, a high demand for flexibility and complex co-ordination problems are the 'normal' conditions of multiproduct batch process settings, where there are frequent changeovers in the products made, a high variety of tasks to be performed, and variability in the type of technology used (Kelley, 1996).

As far as metal cutting and shaping processes are concerned, conventional machining has a tradition of skilled craftsmanship which long resisted any encroachment by Taylorism. It has always served as a model for work organisation based on a limited division of labour and few hierarchical levels - precisely the characteristics that Kern and Schumann ascribe to the *new* production concepts. It is precisely the introduction of modern (C)NC technology which has breathed new life into the Taylorist dream. The opportunities for a more far-reaching division of labour are considerably greater when numerically controlled machine tools are used. It is, then, precisely the flexible (C)NC technology which is labelled as management's umpteenth attempt to take the workers' power over the production process away from them (Noble 1983).

There is nothing inherent in CNC technology, however, that makes it *necessary* to assign the tasks of programming, setting, operating, monitoring, resetting, and so on to different jobs or departments (concentration). Numerically controlled technology only makes such a division of labour *possible*. When asked to what extent machine-tool companies are taking advantage of these increasing possibilities to implement a maximum division of labour, research appears to be particularly interested in whether the CNC operators perform the programming tasks themselves. The Trend Study survey allowed us to estimate the relative scope of workshop programming (deconcentration). Sixty-four per cent of the companies investigated has opted for a system of workshop programming. Most striking is the fact that all the smaller companies have done so, whereas the companies which maximise concentration tend to be larger ones (i.e. more than 60 employees in production jobs).

Table 9. Integration of setting and programming tasks in the operator's job (percentage of operator jobs, counted over 47 companies)

	Smaller companies	Larger companies
Operating/monitoring	7%	5%
Operating/monitoring and setting	40%	77%
Operating/monitoring, setting and programming	53%	18%

The result of this difference in degree of deconcentration between smaller and larger companies is that the share of machine operators who perform programming tasks is considerably higher in the smaller companies (Table 9). Production managers of the companies investigated were asked to indicate what percentage of their CNC operators perform programming tasks or set the equipment. In the smaller companies 53% of the operators are in charge of programming-related tasks. In the larger companies that is less than one in five. If we perform an abstraction on the difference between smaller and larger companies, the integration of setting tasks appears to be the rule (73 per cent of the operators). Twenty-one per cent of the operators perform setting and programming tasks. Their jobs may be considered completely integrated. About one in four companies has opted for full integration.

In reality, programming consists of a cluster of operations of widely varied complexity and difficulty. They vary from communicating processing deviations to adjusting the targeted parameters and complex programming work. The following diagram therefore refines this concept somewhat by presenting a hierarchy of programming tasks: from 'almost always integrated into production jobs' to 'frequently removed through concentration'.

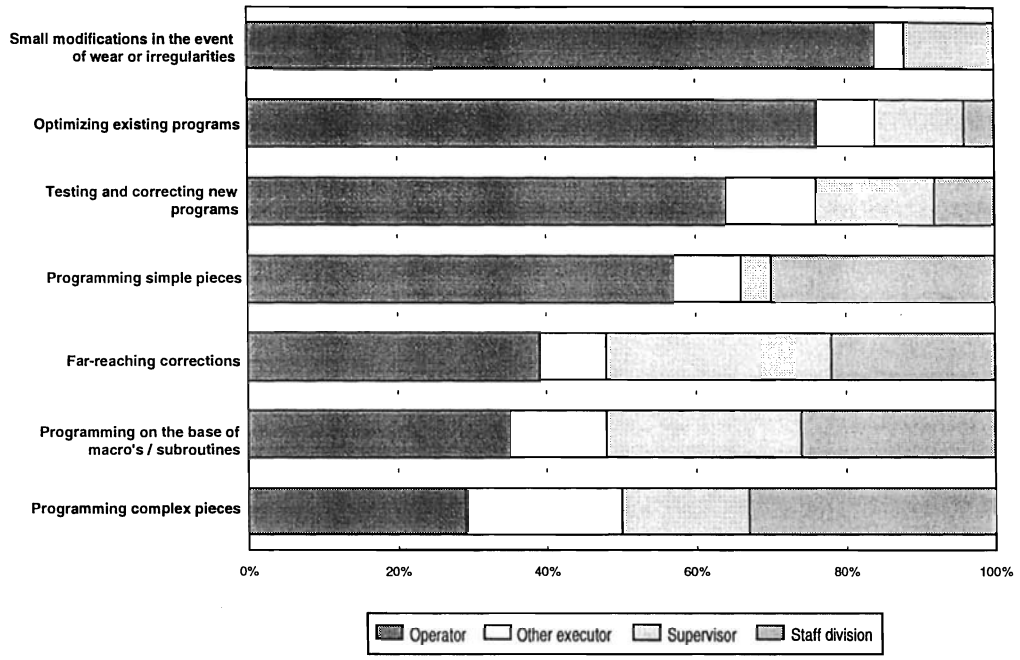

Figure 4. Options of companies with regard to programming tasks : who is responsible for the task ? (percentage of companies)

If adding small changes in the event of wear and tear or irregularities, or working in and optimising existing or new programs are included in the definition of 'programming', then we can say without exaggeration that machine tool companies are tending towards integration of programming tasks in the operator jobs. Even programming simple pieces is as a rule left to the operators. Machine tool companies are, however, much more restrictive when it comes to adding far-reaching corrections, programming based on program macros or programming complex pieces. Conclusion: in the majority of companies, tasks related to programming are *partially* integrated. All things considered, the division of labour in the machine shops is far from extreme. In general, not only the programming tasks, but also the support tasks like machine maintenance and quality control are fairly well integrated.

Skilled work continues to be widespread not only in the relatively highly automated machine shops, but also in the assembly departments with their low level of automation. The picture that appears from the analysis shows us that assembly work can also be different than the narrow, short-cycled work that the automotive sector provides. It would be inappropriate for these reasons, however, to proclaim the machine tool sector to be a sector in which new production concepts are flourishing. Here it is not so much a matter of the rise of new concepts, but rather of a continuation of the traditional craftsmanship. Whether this craftsmanship is timeless, is the big question. In an effort nonetheless to standardise the work insofar as possible, increasing experimentation is being done with modular work in the

assembly process (stretching out the assembly process by pre-installing separate modules) and by drawing a sharper distinction between mechanical assembly and electrical assembly. Some companies are trying to force even the assembly process into a line structure. For this purpose, they are attempting to standardise the products as much as possible. Thus short-cycle labour is making its entrance even into the machine-tool industry.

5. The delayed transformation

There is now widespread agreement that, during the last 10 years, there have occurred substantial changes in production and work organisation, manifested in new ways of utilising both fixed capital and labour (Lane, 1995). But there is still disagreement about the extent and nature of such transformations. Equally contested is the issue of whether the emerging new trends represent a radical break with the past or a refinement or modification of old trends.

Our empirical data make it possible merely to suggest a 'neo' rather than a 'post'-Taylorist or Fordist concept. The changes taking place have in common that they do not change the fundamental nature of the production system. They are reforms at the margins of the Fordist-Taylorist production system. Table 10 highlights similarities and divergencies between the four branches investigated. This generalising categorisation can only be tentative, due to the diversity of patterns between different types of firm.

Table 10. Summary

	Automotive industry	Clothing industry	Chemical industry	Machine tool industry
Deconcentration	+	-	-	+
Decentralisation	+	-	-	+
Integrated jobs	-	-	-	+
Product-oriented production	-	-	-	+/-
Broad jobs	-	-	+	+

At first sight, the new production concepts only have effected a breakthrough in the machine tool industry, where the picture of forms of production and work organisation shows a consistent move in the direction of (partially) integrated jobs, deconcentration and decentralisation. The crucial question, however, is whether this is all that new. As we mentioned earlier, it is more correct to refer to timeless craftsmanship than to new production concepts in the machine-tool industry.

It is clear that there is a discrepancy between the expectations surrounding the new production concepts and our empirical observations of the same (compare

Altmann and Düll, 1990). It is notable that Schumann's research team in the Trend Report also come to the conclusion that the penetration of new production concepts has been going less well than initially suggested. They even speak of *'die verlorene 80er Jahre'*, the lost eighties (Schumann et al., 1994). A possible explanation is that the Taylorist and Fordist methods of production are much more adaptable than expected. According to our data, it is beginning to look more and more as though improvements in flexibility and quality of production can in fact be achieved without departing from the structuring principles of the traditional production concepts. In order to explain this 'delayed transformation', the supposed driving forces behind the transformation towards less division of labour need to be critically examined: (1) the supposed market fragmentation; (2) the increasing level of automation and (3) changes in the labour market.

Market fragmentation

While Ford implemented rigid product standardisation in order to standardise operations, product differentiation does not preclude standardisation of operations, as a distinction should be made between 'small batches' and 'short runs'. With short runs a standardisation of operations is hard to achieve. Indeed many industries with short runs, such as the machine-tool industry, have never been 'Taylorized'. Yet, the flexibility of the 'lean production' model for example, is concerned with frequent changes between standardised models, in which the same methods can be employed. This process of change-over can be standardised as well, and implies for workers a variation on the same simple tasks.

Anyone visiting a car assembly plant will notice that the amazing production flexibility is achieved not by some system of autonomous teams, but rather through the more intensive control of the overall production flow made possible by information technology, in which all parts have to switch simultaneously like cogs in a cogwheel. The kind of flexibility needed in no way requires a 'return to craft' in which "plants are increasingly engaged in the manufacture of specialised goods tailored to the needs of particular consumers and produced by broadly skilled workers using capital equipment that can make various models" (Katz and Sabel, 1985, 297-8).

Increasing levels of automation

By the same token, increasing levels of automation have often been pointed to as establishing a fundamental new relationship between workers and management. Within the automated segments the system regulators are no longer potential obstacles to increased productivity, but rather are the essential key to the smooth operation of the process. As such, the task of the system regulator can not be 'Taylorized' as a certain degree of autonomy is necessary in order to react to stochastic events. But this autonomy is overstated in the thesis of new production

concepts, as this 'new worker' is subject to the comprehensive control made possible by the widespread use of information technology based on computer-integrated control of production and personnel information systems. This autonomy is further limited by the increased power delegated to lower parts of the managerial hierarchy (Dankbaar, 1988). Moreover, as has been illustrated, the quantitative importance of this new type of labour is still small and it bears no relationship to the attention it receives.

Changes in the labour market

Finally, changes in the labour market are often referred to as a principle cause of changes in the division of labour. This is perhaps most clearly exemplified by the much discussed alternative work organisation in the Swedish plants - a form of organisation which is often said to have grown out of specifically Swedish situations in the labour market. As Gyllenhammer (1977, 9) puts it in the title of his introductory chapter: "The Swedish way is best - for Sweden". Labour market factors which favour less division of labour include (Berggren, 1992, 11):

- a low level of unemployment (offering workers alternatives in seeking work);
- higher levels of education among the workers;
- high levels of social benefits, which in addition are linked to the welfare state and not - as is the case for Japan - to the company in which the worker is employed. This allows workers to demonstrate their frustration, for example, through high levels of absenteeism;
- low wage differentials between companies and sectors, which denies companies the opportunity to compensate for boring work through high wages.

Currently, however, such pressures from the labour market are rather weak in Belgium. Although education levels are extremely high - school attendance is obligatory till 18 years of age - this is in itself no guarantee for changes in the division of labour. As shown by the case of the clothing industry, an abundance of well-trained and experienced workers may facilitate the implementation of new production concepts, but it is not sufficient if other factors intervene. One of these is undoubtedly the ongoing high level of unemployment, which shifts the attention from the 'quality of work' to the 'quantity of work'.

The described trends in market transformation, diffusion of new technologies and labour market structure can partly explain the 'delayed transformation'. On the other hand, however, research on the effects of innovative work practices has shown that they can improve business performance (Ichniowski et al., 1996; Osterman, 1995). Hence, the question remains: why have these innovative practices not diffused more widely through the economy ? Unfortunately, we have little hard evidence or good theory to provide answer to these critical question. One part of the answer may be due to difficulties in changing management practices and

organisational cultures. Trajectories of workplace change cannot be understood simply as a product of new technological and organisational developments, but are conditioned by deeply embedded traditions of industrial practice (Tomaney, 1994). More specifically, a move towards less division of labour is not necessarily welcomed by workers and unions, as much of the changes in the division of labour, though tentative, are attempts by management to achieve work intensification.

Splitting up staff departments and bringing them into a closer relationship with production results in staff functions coming under greater production pressure. Job integration for production jobs entails broader responsibilities and greater stress for workers. The integration of simple indirect tasks into production jobs makes it possible to cut back staff support, while imposing more responsibilities and stress on workers as they can no longer afford to be merely concerned with output. Multifunctionality is often an attempt to despecialise workers which increases peer pressure within 'teams' and makes it possible to run the factory with minimal manpower. A decrease in the division of labour is often considered by unions to be a 'Trojan horse'. The speed and depth to which a new concept can be implemented is therefore influenced by the employment relationship. We have identified the traditional employment relationship as it has emerged from Fordist practices and is today still in place as one of the main factors contributing to the delay in such a transformation (Huys, Sels and Van Hootegem, 1995).

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